

pleted and much more must be done before we can feel entirely satisfied with our results. When, however, we consider that the results today are much better than our early efforts we can hope for a much brighter future.

The rather high incidence of jejunal or gastrojejunal ulcers following gastrojejunostomies should make us think more frequently of some of the pyloroplasties or of gastroduodenostomies. The jejunum is ill adapted to receive stomach contents before they have been thoroughly alkalized by the bile, pancreatic juice and the succus entericus, and it seems logical to have the stomach drain into the duodenum whenever the surgical condition permits.

From a mechanical standpoint, the surgery of stomach cancer is on a fairly high level of efficiency, but unfortunately in many cases we cannot make the diagnosis of malignancy early enough to get cures. The silent carcinomas of the stomach are all too numerous.

BURNS S. CHAFFEE, M.D. (917 Security Building, Long Beach)—Doctor Woolsey has presented an excellent review on the subject of gastric surgery. The detailed, painstaking care in the preparation of the patient, the operation of choice and technique, and the postoperative care, are all essential in securing good results.

Too great emphasis cannot be placed on gentleness in the handling of tissues in the abdominal cavity, especially in gastric surgery.

I have been very much interested in pyloroplasties, and especially the Finney type, for the treatment of ulcers in the region of the pylorus. This operation affords the opportunity of observing the mucous membrane of both the duodenum and the stomach for a distance of several centimeters from the pyloric sphincter and enables the surgeon to remove the ulcers or treat them with the cautery.

There are many cases in which it is impossible to mobilize the duodenum; however, there are many cases in which the duodenum can be mobilized by careful dissection and the severing of adhesions.

Patients usually do exceptionally well following this operation. Their convalescence is no more stormy than that of patients operated for chronic appendicitis.

A fluoroscopic examination of cases under my care and observed by T. R. Brown twelve to eighteen months after the operation revealed a normal functioning pylorus.

## GASTRO-INTESTINAL SYMPTOMS MASKING GALL-BLADDER DISEASE\*

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DISCUSSION by Wallace I. Terry, M.D., San Francisco; Sterling Bunnell, M.D., San Francisco; Andrew Stewart Lobingier, M.D., Los Angeles.

GALL-BLADDER disease can be easily diagnosed when the typical symptoms are present. But this is not always the case, and the recognition of the gall bladder as the locus of abdominal pathology, even when such pathology is well advanced, is frequently very difficult. Most surgeons have met with puzzling cases in which positive symptoms point to the stomach or lower abdomen as the seat of trouble, and in which no symptoms incriminating the gall bladder can be found, that, on operation, disclose a badly degenerated or calculous gall bladder or ducts. Indeed as a concrete example of the frequency of such fallacious symptomatology I may quote Pfahler's<sup>1</sup> remark respecting the roentgen-ray examination of such patients: "The great major-

ity of patients sent to me for an examination of the 'stomach' because of stomach symptoms do not have any lesion in the stomach but have disease of one of the other organs, most often the gall bladder or the appendix."

A part of the atypical symptomatology displayed in such cases may be due to adhesions resulting from old inflammatory processes within the abdomen or to direct adhesion of one viscus to another. Such adhesions may directly embarrass the duodenum or interfere with the passage of food.

But I venture to think that in the great majority of patients in which gall-bladder disease gives rise to atypical pain suggesting gastric or intestinal lesions, these symptoms are of reflex nervous origin and due to the direct and indirect nerve connections between the gall bladder and the gastro-intestinal tract. This view has been impressed upon me by a recent case of this type and by a study of the literature bearing on this subject.

### CASE REPORT

The patient to whom I allude, a widow, age 47 years, had complained of indefinite abdominal symptoms for some years following a hysterectomy in 1919. The general symptoms consisted of soreness and distress in the lower left hypochondrium and over the lower abdomen in general; some frequency and burning micturition; poor digestion; loss of weight and a general tired feeling. In 1923 she was operated upon for a sudden obstruction of the bowel. Since that time until 1925 she had never felt well. She had intermittent attacks of hypochondrial pain radiating at times to the back but mostly down the hip, gas, vomiting, almost constant constipation, nervousness, loss of sleep and general abdominal discomfort. A physical examination disclosed nothing very definite except some left lower abdominal and midline tenderness.

Roentgen-ray examination showed slight bulging in the pars media of the greater curvature of the stomach associated with some irregularity in contour. There was also an apparent absence of peristalsis at this spot. The rugae were generally normal on the lesser curvature side of the stomach. There was no filling defect and in the roentgen-ray examination of the gastro-intestinal tract nothing else was observed either before or after administration of barium meal, which could be considered as distinctly abnormal. The gall-bladder region was quite negative.

No definite diagnosis could be made on the basis of the present history, physical, roentgenologic or laboratory findings. The patient was therefore kept under observation. Two months later we obtained real information from the past history; that at the age of 22 years, while pregnant, she had several attacks of typical gall-bladder colic; after that two attacks each year for five years; then a quiescent period until 1919, when the present complicated history began. It was decided to perform a laparotomy. Two large, black, cholesterol-mixed stones were found in the greatly enlarged common duct; the gall bladder was contracted to about one-third its normal size, chronically inflamed and very friable; there were many adhesions throughout the abdomen and the transverse colon and a few coils of small intestine were attached to the abdominal wall beneath the scar of the old incision. A choledochotomy and partial cholecystectomy were done.

1. The main point which I wish to stress in this case is the presence of such pronounced biliary-tract pathology in the absence of any clini-

\* Read before the General Surgery Section of the California Medical Association at its Fifty-Sixth Annual Session, April 25-28, 1927.

cal or other data which might have suggested it since 1919.

2. A preoperative diagnosis of gall-bladder pathology would not have been made had we been unable to obtain the story of the past history. There was no icterus, no gall-bladder region tenderness, none of the typical pains, nor were the stools such as might have suggested bile trouble. The clinical and other evidence seemed to point to some indeterminate gastric or intestinal lesion. The symptoms I consider to have been mainly the result of reflex reactions from the gall-bladder although no doubt the presence of the many adhesions contributed.

#### REFERENCES IN LITERATURE

On looking over the literature I find a certain number of facts pertinent to this case, especially to the reflex symptoms arising in the digestive tract in connection with gall-bladder disease.

Ramond and Parturier,<sup>2</sup> in a quite recent article, have called attention to the particular reflex reactions. They mention especially the commonly observed spasm of the pylorus, mesogastric spasm, esophageal spasm, and colonic spasm. While any of the segments of the colon may show isolated spasms under gall-bladder excitation, Ramond and Parturier refer to two which are especially prominent, viz., ceco-colic spasm and that of the left colic angle. Both of these spasms are observed with great frequency in patients with cholecystitis.

The state of constipation, diarrhea or muco-entero-colitis, which accompany acute or chronic cholecystitis, Ramond and Parturier think can only be the effect of colonic reflexes from the gall bladder.

The points in the digestive tract in which reflex spasmodic effects of vesicular origin are produced are, according to Ramond and Parturier, exactly those referred to by Blamoutier<sup>3</sup> as the predominant sites of antiperistalsis.

One of the most interesting features of my own case, the value of which has only recently come to my notice, was the radiologic showing of an incisura in the great curvature of the stomach almost suggesting a slight bilocular condition. Ramond and Parturier refer very particularly to this mesogastric spasm of vesicular origin as an important indicative sign of gall-bladder disease when found in connection with spontaneous left hypochondrial pain and appearing about four hours after eating. At the same time radioscopy shows a normal small curvature. Ramond and Parturier report a case in which the radiological determination of this mediogastric spasm clinched the diagnosis.

#### REFLEX SYMPTOMATOLOGY

In order to understand the reflex symptomatology arising in connection with gall-bladder disease we must have a clear idea of the nervous connections of the viscus.

In regard to the nerves supplying the gall bladder and their relationship to the innervation of the gastro-intestinal tract; Griffiths<sup>4</sup> states that the nerve supply of the gall bladder is de-

rived from the hepatic plexus which is an offshoot from the celiac plexus, itself derived from the fifth to tenth thoracic nerves. There are also fibers from the right phrenic nerve.

Freese<sup>5</sup> states that Heidenhain and Doyen showed that the gall bladder and ducts received motor fibers by way of the splanchnics. The musculature of the gall bladder is provided with both constrictor and dilator nerve fibers by the splanchnics. Both the motor and inhibitory fibers arise from the spinal cord in the roots of the sixth to the thirteenth dorsal nerves.

Piersol's Anatomy (p. 1370) states that fibers from the hepatic plexus traverse the lesser omentum, the bile duct, the hepatic artery and the portal vein; and, after inosculating with fibers of the left vagus, enter the liver in which they ramify. In addition to its terminal distribution the plexus contributes filaments to the right supra-renal plexus and furnishes offshoots which follow the collateral branches of the hepatic artery supplying the areas in which these arteries are distributed.

The study of the nervous connections of gall bladder shows how easily irritation from disease in this viscus, even if latent, may give rise to symptoms which suggest lesions in various other regions and organs of the abdomen. This study should serve to warn us against the fallibility of abdominal symptoms unless their origin is unmistakable. Indeed a study of gall-bladder disease literature is very eloquent in this regard.

Griffiths,<sup>4</sup> Hunterian lecturer Royal College of Surgeons, England, who has done considerable investigation on the anatomy and physiology of the gall bladder, is very insistent that irritation of the mucous membrane of the gall bladder causes a reflex irritation, which is most marked by its action on the stomach.

Thies<sup>7</sup> in discussing the abdominal symptoms with a vegetative nervous etiology in gall-bladder disease noted that severe constipation was found in 86.6 per cent of the gall-bladder cases studied.

Rohde<sup>8</sup> in the study of two hundred cases of cholelithiasis notes the frequent stomach and duodenum reflex symptoms, especially spasm.

Pottenger<sup>6</sup> states that gall-bladder disease and chronic appendicitis are the two best known conditions for producing colicky pains, spasticity and stasis in the intestinal tract.

Ramond and Parturier in their investigation of gall-bladder disease reflexes rather pointedly refer to the reflex of left hypochondrial pain. The epigastric reflex pain in gall-bladder disease may be felt in the peripheral terminations of the sixth and seventh dorsal nerves independent of any local pathology; or it may be a localized visceral pain due to reflex disturbances of peristalsis. I believe this was the etiology of the pains in my own patient. Of course it must be remembered that the typical radiation of pain from the gall bladder itself in gall-bladder disease may be entirely disturbed by the presence of pericholecystic adhesions.

The marked constipation which often accompanies gall-bladder disease probably arises from

reflex nervous interference with the normal peristalsis of the bowel. This interference may be sufficiently great to produce complete atony.

Spastic, dynamic or functional ileus, sometimes termed paralytic ileus, is often due to reflex spasm of this kind arising from gall-bladder disease.

Moore<sup>9</sup> thinks that atony of the bowel, which may follow lesions elsewhere in the abdomen, has for its most probable etiology disturbances of innervation. The intestinal wall derives its innervation from the vagus and splanchnic nerves. The vagus innervates the whole of the small intestine, and the effect of irritation of its fibers is to increase peristalsis. On the other hand irritation of the fibers of the splanchnics tends to inhibit movements of that portion of the intestine controlled by them. A paralysis of the tract may result from an abnormal overactivity of the sympathetic or from inactivity of the vagi, and such motor disturbances may be of reflex origin.

The ileus of reflex nervous type originating from gall-bladder disease may be mistaken for mechanical obstruction. One of the causes of functional ileus is interference with the nerve supply of the muscular wall of the intestine. This supply is from Auerbach's sympathetic plexus, which is of course connected with the nervous mechanism of the biliary tract. These patients very frequently show the presence of the classical symptoms of intestinal obstruction without any evident symptoms drawing attention to the gall-bladder region.

In conclusion I desire to repeat that gall-bladder pathology is often extremely deceptive in regard to its symptomatology. In the presence of abdominal symptoms which cannot be clearly accounted for, the surgeon should remember that many gastro-intestinal suggestive symptoms are but reflexes originating from a diseased biliary tract. This tract should always be investigated in all abdominal conditions. Mesogastric great curvature, ceco-colic, and left hepatic angle spasmodic phenomena are the most frequent nervous reflex results of gall-bladder disease.

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#### DISCUSSION

WALLACE IRVING TERRY, M.D. (384 Post Street, San Francisco)—Doctor Toland has done well in calling our attention to some of the unusual manifestations of gall-bladder disease. It is certainly true that gastro-intestinal symptoms are dominant in a fair proportion of cases where the gall bladder is the only diseased organ found at operation. Yet I can recall but two such cases which did not have a tender head

area over the ninth or tenth rib posteriorly on the right side.

Cholecystography is of great importance in the diagnosis of gall-bladder disease and, of course, would have thrown light on the case discussed by Doctor Toland.

The description given in the paper of the various sympathetic links between the gall bladder and other viscera, is illuminating and important.

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STERLING BUNNELL, M.D. (516 Sutter Street, San Francisco)—The normal physiology of the gastro-intestinal tract as evidenced by x-ray and clinical symptoms is readily upset by any irritant in the vicinity whether inflammatory or mechanical. It is altered to a greater extent by irritation from organs of the digestive tract than by those in other systems, and to the greatest extent by those that center about the most vulnerable part, the solar plexus, such as the gall bladder. Unless we interpret the findings on broad principles, instead of as specific effects of the gall-bladder, confusion is bound to arise.

From the cardia to the rectum there are four regions of prominent sphincteric action which are starting points of spasm, reverse peristalsis, and reflex inhibition, and these are affected in different ways according to the idiosyncrasy of the individual and the location and character of the irritant. The effects of an irritant in certain locations are apt to be grouped along the digestive tube in the segment where the nerve connections are the more intimate. Thus the gall bladder affects, in the order of intensity, the pylorus, cardiac orifice, ileocecal region and the descending colon; but other irritations in the gall-bladder region may do the same. The kinds of irritations from the biliary tract are also quite dissimilar. Some are mechanical, as from stone, stricture, or overacting cystic kink or from traction of adhesions; and others are inflammatory, as cholecystitis, hepatitis, adenitis, or pancreatitis. Within these there are variations in type and intensity. Therefore the differences in reflex effects are great. We should learn not only the coincidence but the meaning of each, and our judgment must be based more on the underlying principles than, empirically, on specific signs. Cholecystography aids greatly. At times, however, the gall bladder is at fault; not only when localizing signs or symptoms are absent, but also when at operation the macroscopic pathology is scarcely recognizable. In such cases we must be guided by our judgment of the whole case history.

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ANDREW STEWART LOBINGIER, M.D. (Merritt Building, Los Angeles)—For many years a confusing gastro-intestinal symptom complex misled the diagnostician in interpreting the true pathology in the liver, gall bladder, and pancreas. We are indebted to the illuminating clinical studies conducted in the Leeds Clinic for the clarification of this symptomatology. We learned not to wait for terminal symptoms such as jaundice, bile in the urine and nocturnal colic to diagnose gall-bladder disease. Gas distension, discomfort on taking food, light chilly sensations, tenderness over Robson's point and rigidity of the upper right rectus are the early signs of an infected liver and gall bladder. Pylorospasm without classical symptoms of ulcer; paresis and retention of gas in the hepatic flexure and first portion of the transverse colon; spasticity of the descending colon with pain in those areas of colonic distension, are the usual concomitants of chronic hepatitis and cholecystitis. We believe these conditions are due as much to omental adhesions to the angle of the colon or to the gall bladder and duodenum as to reflexes from the inflamed loci. There is an unquestioned reflex to the gastric antrum and to the descending colon. But an acute hepatitis and an acute cholecystitis are as apt to be followed by chronic perihepatic and pericholecystic adhesions to the duodenum and omentum, as a matted down and obstructed hepatic flexure may follow an appendicitis or a prolonged ulcerative colitis.

We have so frequently found obstructive adhesions associated with the gastro-intestinal symptom complex seen in cholecystitis with or without gall-stones, that it seemed obvious that reflexes from a disturbed innervation to the viscera must take a secondary position in accounting for the symptoms.

Doctor Toland's paper affords suggestive interest for a more extended clinical study.

## THE PELVIC FLOOR—CONSIDERATIONS REGARDING ITS ANATOMY AND MECHANICS\*

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### RÔLE OF THE LIGAMENTS

ALTHOUGH the obliterated and unobliterated vessels, the nerves and their surrounding connective tissue sheaths and also the fascial extensions upon the pelvic viscera, no doubt are important factors in the maintenance of the position of the pelvic organs, it would seem that the rôle played by the broad, and especially that played by the sacro-uterine and round ligaments in pelvic support, has been greatly overestimated. Schroeder,<sup>16</sup> 1922, emphasized this in connection with the question of malposition and prolapse. He regarded these ligaments as only of secondary importance, and the muscles, vagina wall and connective tissue as the real supports of the uterus. According to him the round ligaments are relaxed even in a retrodisplaced uterus.

It may be that the favorable results reported after shortening of the sacro-uterine or the broad ligaments may have been due in a considerable measure to the resulting adhesions and to the contractile effect of the scar tissue formed at the site of operation. Tschaussow,<sup>17</sup> 1887, also concluded that the uterosacral ligaments have only a negative influence. He added that muscle fibers are not always present in these "peritoneal folds" of children and that they are wholly insignificant in them as in the case of adults.

The sacro-uterine ligaments are really not such. This was implied by Somers and Blaisdell,<sup>18</sup> 1913, and by Blaisdell,<sup>19</sup> 1917, who spoke of them as "potential ligaments," and Dixon<sup>6</sup> quite correctly said that our attention frequently is directed "to strands of connective tissue often described as ligaments." It is clear that potential ligaments exist wherever there is considerable subserous tissue, but they have no existence in fact and they surely cannot be operated upon. Nor must it be forgotten that prolonged traction upon subserous tissues or the peritoneum may result in local thickening anywhere. The variously directed connective tissue fibers will assume a more parallel direction under these conditions. This is illustrated by the statement of Cuthbertson that "not infrequently the uterosacrals are so thin that they can be discovered only by making traction on the cervix."

Although the sacro-uterine plicae of peritoneum also contains smooth muscle they nevertheless

are very inconstant both as to prominence and extent. They do not always reach the sacrum and never are attached to it firmly. Hence, even when they do reach the sacrum the terms rectogenital and recto-uterine would seem to be preferable.

Although these peritoneal folds are rather inconstant I cannot regard them as altogether unimportant, and if operations performed upon them or the included connective tissue and muscle, have resulted so favorably this is excellent proof of the fact that the peritoneum is not a negligible factor in pelvic support. Their direction is rather unfavorable for checking the descent of the uterus and vagina, and it would seem that they undoubtedly have been made too much of. The smooth muscle within them has even been named *retractoruteri*, much as we speak of a suspensory muscle of the duodenum, and these muscular fasciculi have even been regarded as tensors of the anterior vaginal wall and of the vesicovaginal fascia and Smyly,<sup>20</sup> 1919, regarded them as dilators of the fornices, causing ballooning of the vagina, said to be present in threatened abortion. The recto-uterine ligaments have been represented as fully a centimeter wide and one-half that thick in illustrations accompanying articles on operations for the correction of uterine displacements and in other literature in connection with this subject.

The pubovesical ligaments and the tendinous arches of the pelvic fascia firmly anchor the bladder, but it would seem that considerable displacement of it and of the urethra can occur by rotation about the lower border of the pubic symphysis as an axis, without much stretching of these ligaments. Hence they do not seem to be of such great importance in the beginning of prolapse, and I doubt whether general pelvic prolapse is initiated by lesions in the urogenital diaphragm alone, for injury to the pelvic diaphragm and fascia would seem to be a *sine qua non* for much yielding of the urogenital diaphragm. Nothing could better illustrate this than the drawing of a sagittal section of the pelvis of a multipara shown in figure 4. Although the bladder is markedly lowered in position, dislocation of it is not nearly so marked as in the case of the uterus, ovaries, and rectum. In this case the uterus, and especially the round and broad ligaments and, of course, the contained vessels and nerves were greatly stretched. The same thing was true of the pudic vessels and nerves, and had it not been for the firm resistance of the urogenital diaphragm and the pubovesical ligaments the bladder undoubtedly would have been displaced much more.

Muscles unsupported by other structures do not bear the strain of constant tension well. They are likely to yield under it. This applies particularly to the pubo- and iliococcygei, which are thin muscles and which play a rôle phylogenetically foreign to them, representing flexors and abductors of the tail. Since Williams<sup>21</sup> stated that the levator ani may be half a centimeter thick he probably had living hypertrophied muscles in mind, for I have never seen a muscle even in

\* This is the second of two papers on this subject, the first paper being printed in this journal in last month's issue.

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